

# Modern Olives

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## **“Evaluation of new analytical methods to detect lower quality olive oils”**

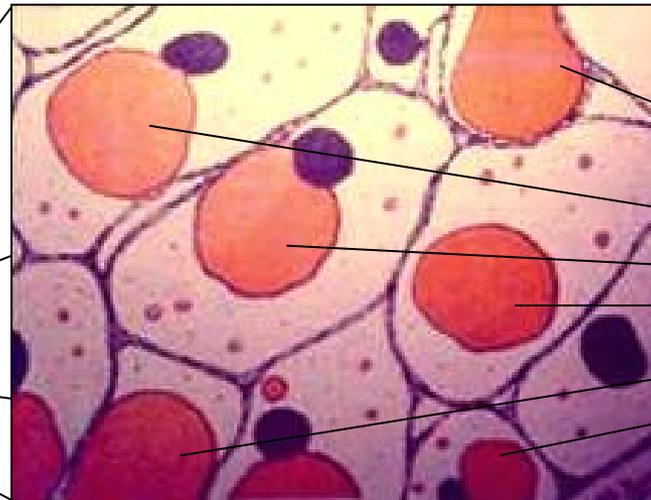
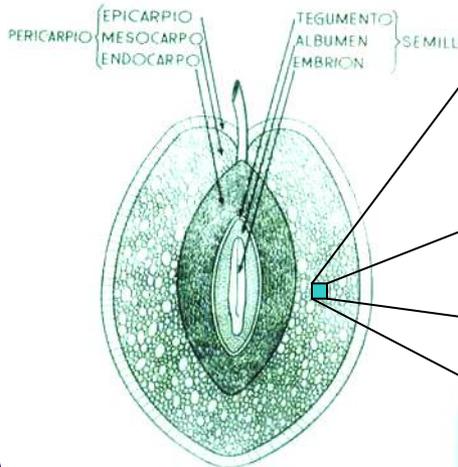
**Claudia Guillaume & Leandro Ravetti**

**Modern Olives with the financial support of**

**Rural Industries Research and Development Corporation**

# The question: What is extra virgin olive oil?

Extra virgin olive oil is obtained **solely** from the fruit of the **olive** tree (*Olea europaea* L.) by **mechanical** or other physical means under conditions, particularly thermal, that do not lead to alterations in the oil, and which have not undergone any treatment other than washing, decantation, centrifugation and filtration. It clearly excludes oils obtained using solvents or re-esterification processes and of any mixture with oils of other kinds.



Detail of cells in the olive flesh



# Trade Standards for Olive Oil

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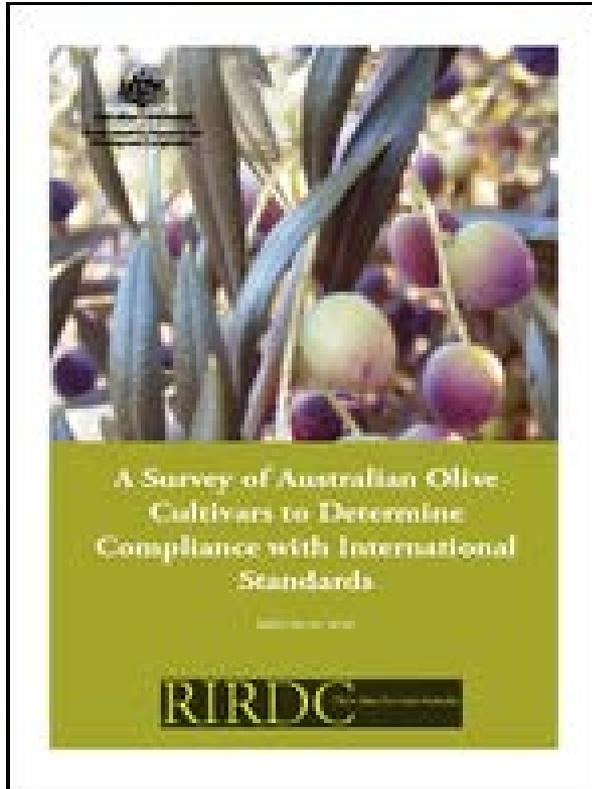
- The most widely accepted international standards for olive oils and olive-pomace oils are:
  - **Codex Standard** for Olive Oils and Olive Pomace Oils - Codex Stan 33-1981 (Rev. 2-2003).
  - **International Olive Council Trade Standard** Applying to Olive Oils and Olive-Pomace Oils - COI/T.15/NC N° 3/Rev. 3 November 2008.
- Other relevant standards due to the olive oil and olive pomace oil volumes traded in those countries are:
  - **European Commission Regulation** (EEC) N° 2568/91 of 11 July 1991 on the characteristics of olive oil and olive-residue oil and on the relevant methods of analysis and subsequent amendments.
  - **United States Standards** for Grades of Olive Oil - Effective date March 22, 1948 together with their current Proposed United States Standards for Grades of Olive Oil and Olive-Pomace Oil – Release date March 28, 2008.
- There is **no mandatory standard in Australia for olive oil.**

# Problems with International Standards

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- Based on average European oils' characteristics and do not contemplate new world's olive oils.
- Do not make any reference to the shelf life of the oils and the necessity for a best before date.
- Do not detect refined olive oils utilising new technologies (e.g. Soft Column®).
- Strong reliance on organoleptic assessment.
- Confusing denomination of the different categories.

# Natural Chemistry of Australian EVOO



# The need for a Best Before

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- Oxidative stability: Shelf life.
  - Temperature.
  - Light.
  - Oxygen.
- Storage
  - Containers.

**AORL – NSW I&I - RIRDC**

# New Refining Methods



# New Refining Methods

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# New Refining Methods



# Tests

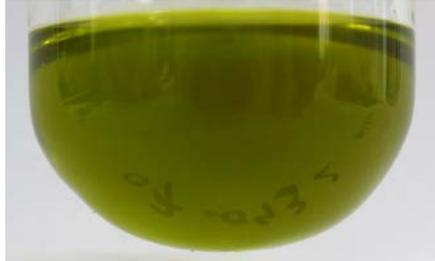
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## Analysis

- Pyropheophytins (PPPs). DGF Standard Method C-VI-15(06) – ISO 29841:2009.
- 1,2-Diacylglycerol Content (DAGs). DGF Standard Method C-VI 16(06) – ISO 29822:2009.

# Pyropheophytins

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Not heated



80°C 60 min



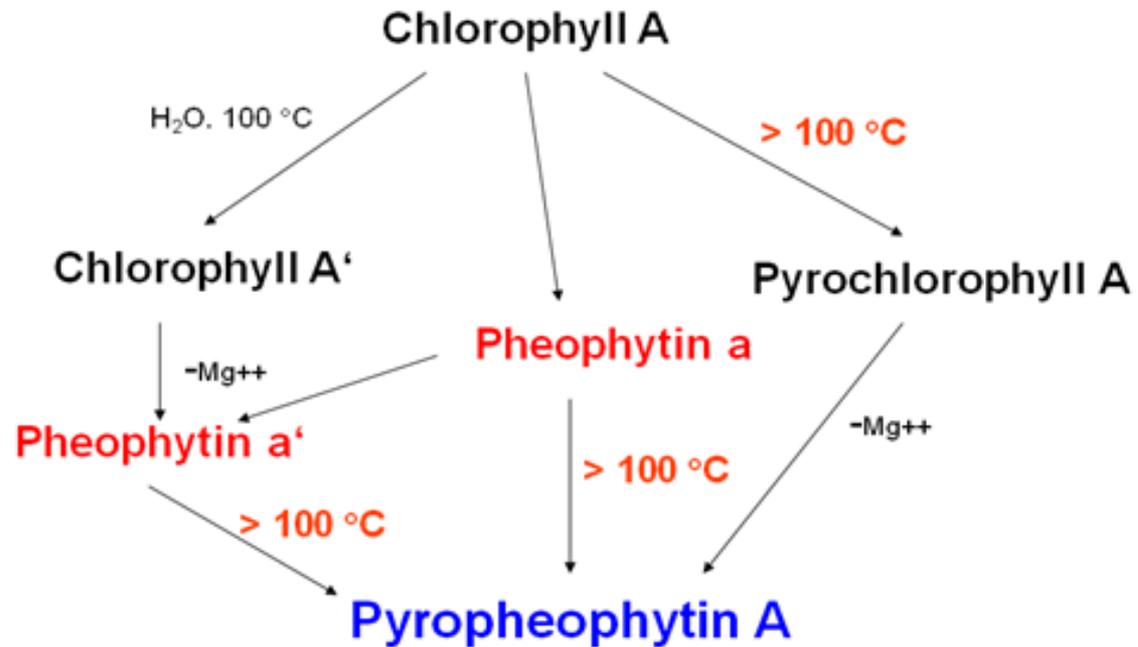
120°C 60 min



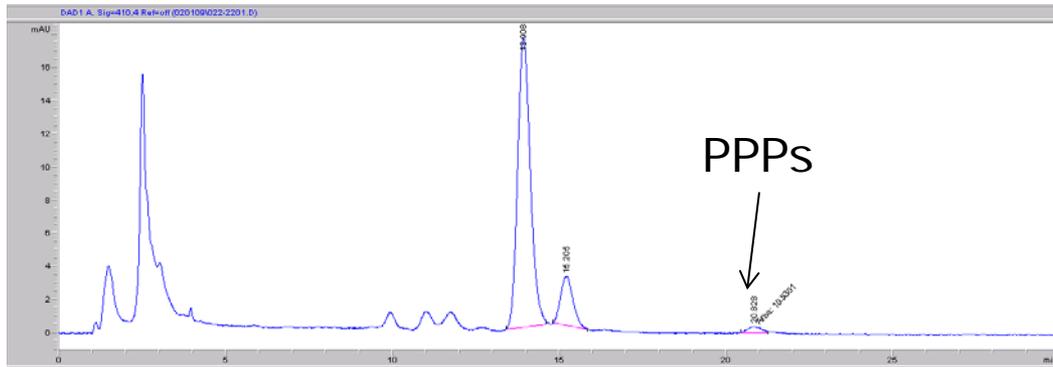
160°C 60 min

# Pyropheophytins

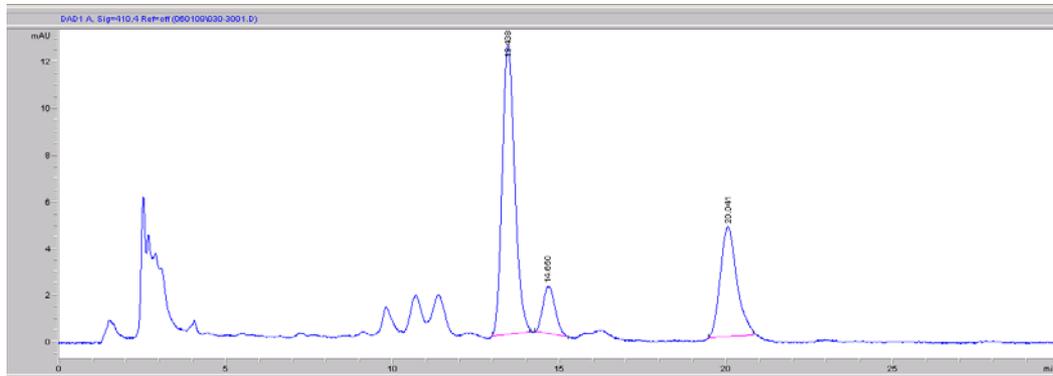
## Chlorophyll Degradation Products in Olive Oil (Lit. K.Aizetmüller. Fett/Lipid 1986)



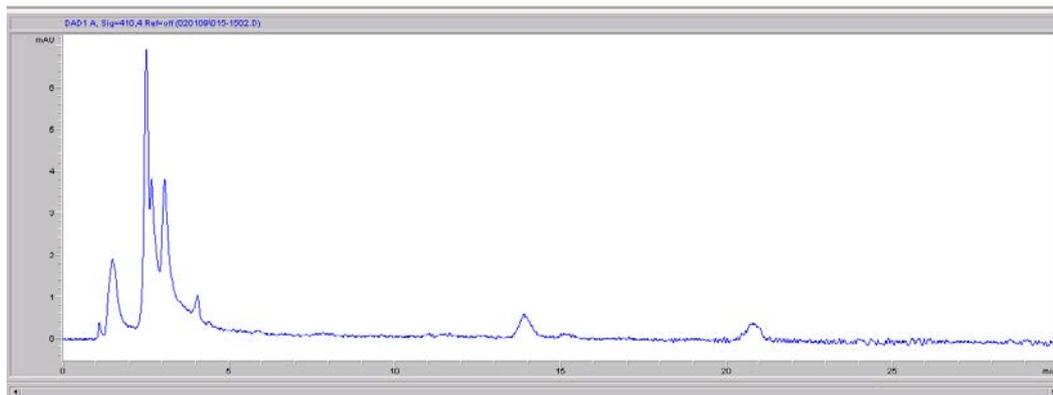
# Pyropheophytins



PPPs < 2.0%

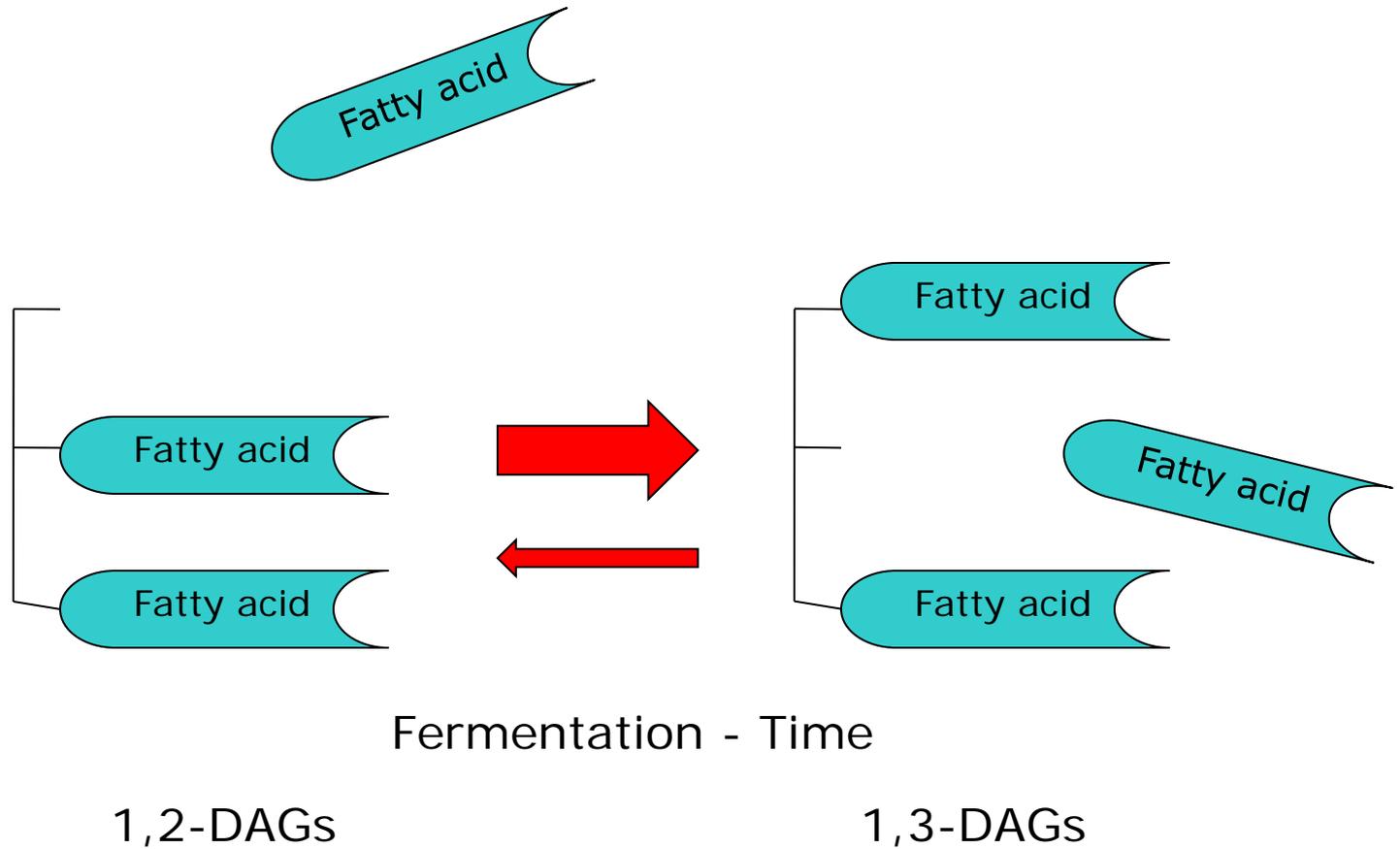


PPPs = 30.5%  
(Soft refined)

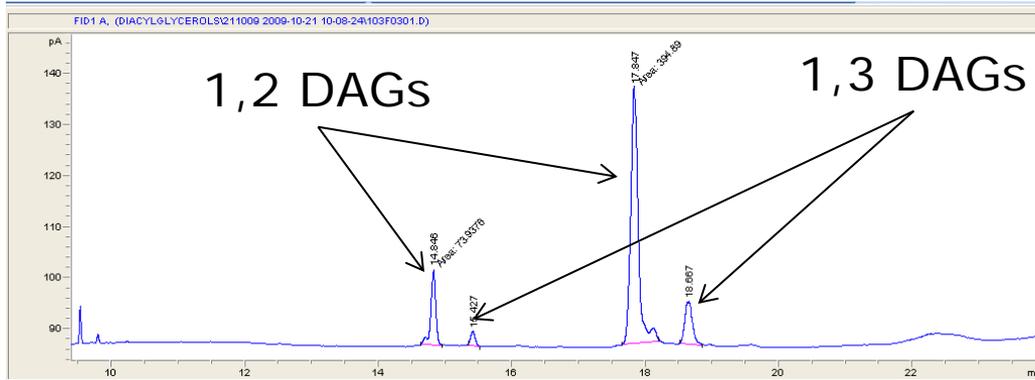


Traditionally  
refined oil

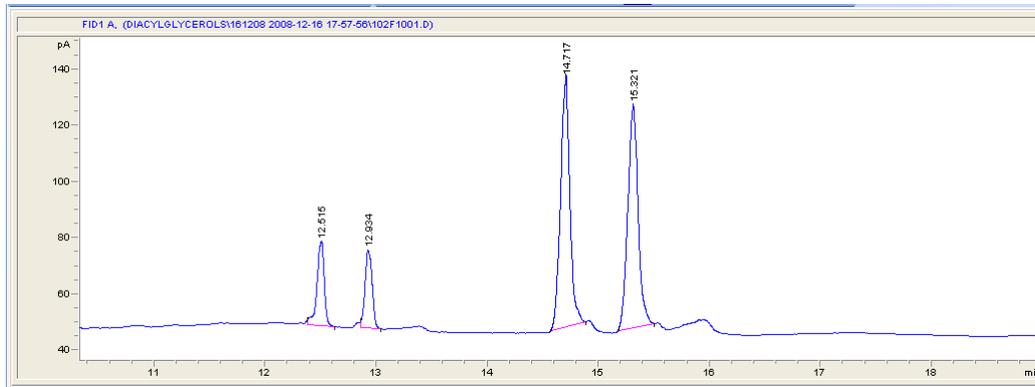
# 1,2 Diacylglycerols



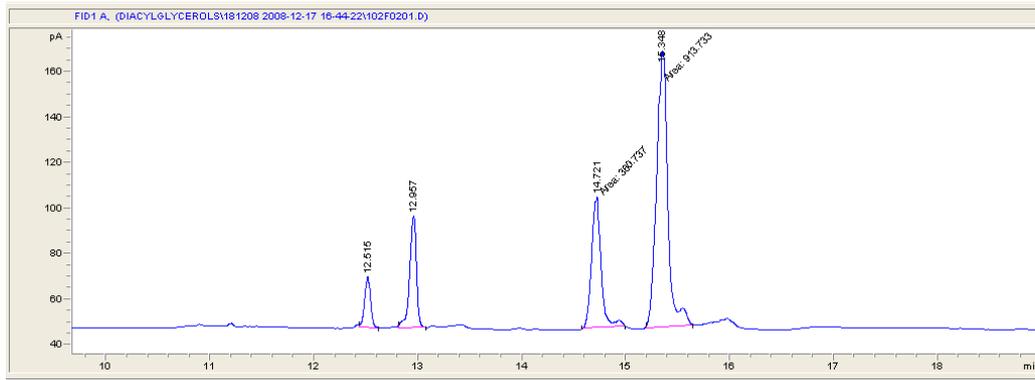
# 1,2 Diacylglycerols



DAGs > 90.0%



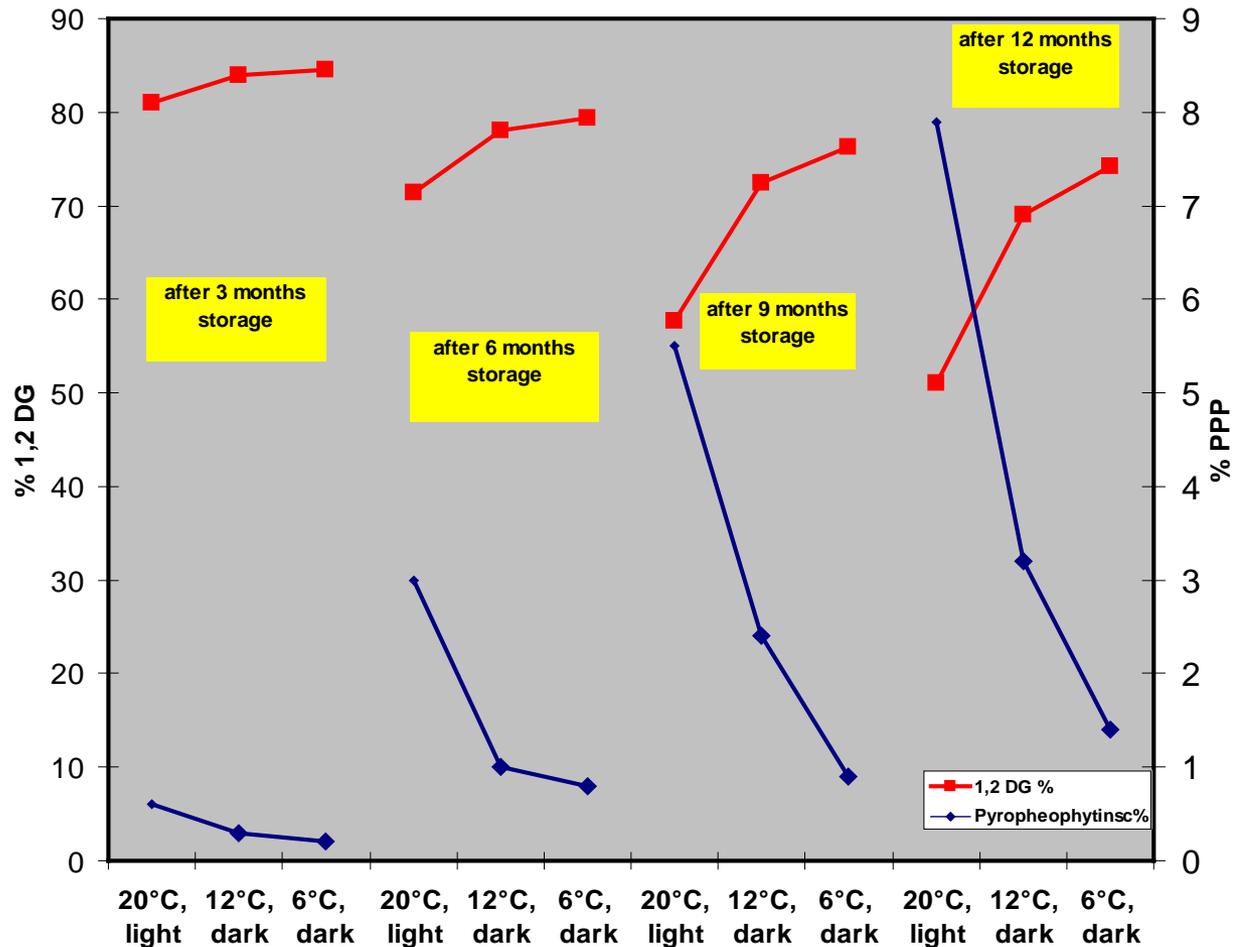
DAGs = 55.0%



DAGs = 30.0%

# PPPs, DAGs, Time & Temperature

Changing Values of PPP and DG during Storage with Increasing Temperatures and Duration (Gertz, C. 2009)



# The Research Project

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## How are the tests going to be evaluated?

- Two complete random Supermarket/Food Service/Boutique Studies
  - Australian
  - Imported
- One complete evaluation within most Australian varieties and environments.
- Their evolution in time.

# Supermarket Study

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## What was sampled?

- Boutique
  - Australian
  - Imported
- Supermarket
  - Australian
    - ≤ 1 litre
    - > 1 litre
  - Imported
    - ≤ 1 litre
    - > 1 litre

## Where?

- Woolworths.
- Coles.
- IGA.
- Foodworks.
- ALDI.
- Oliv.

## When?

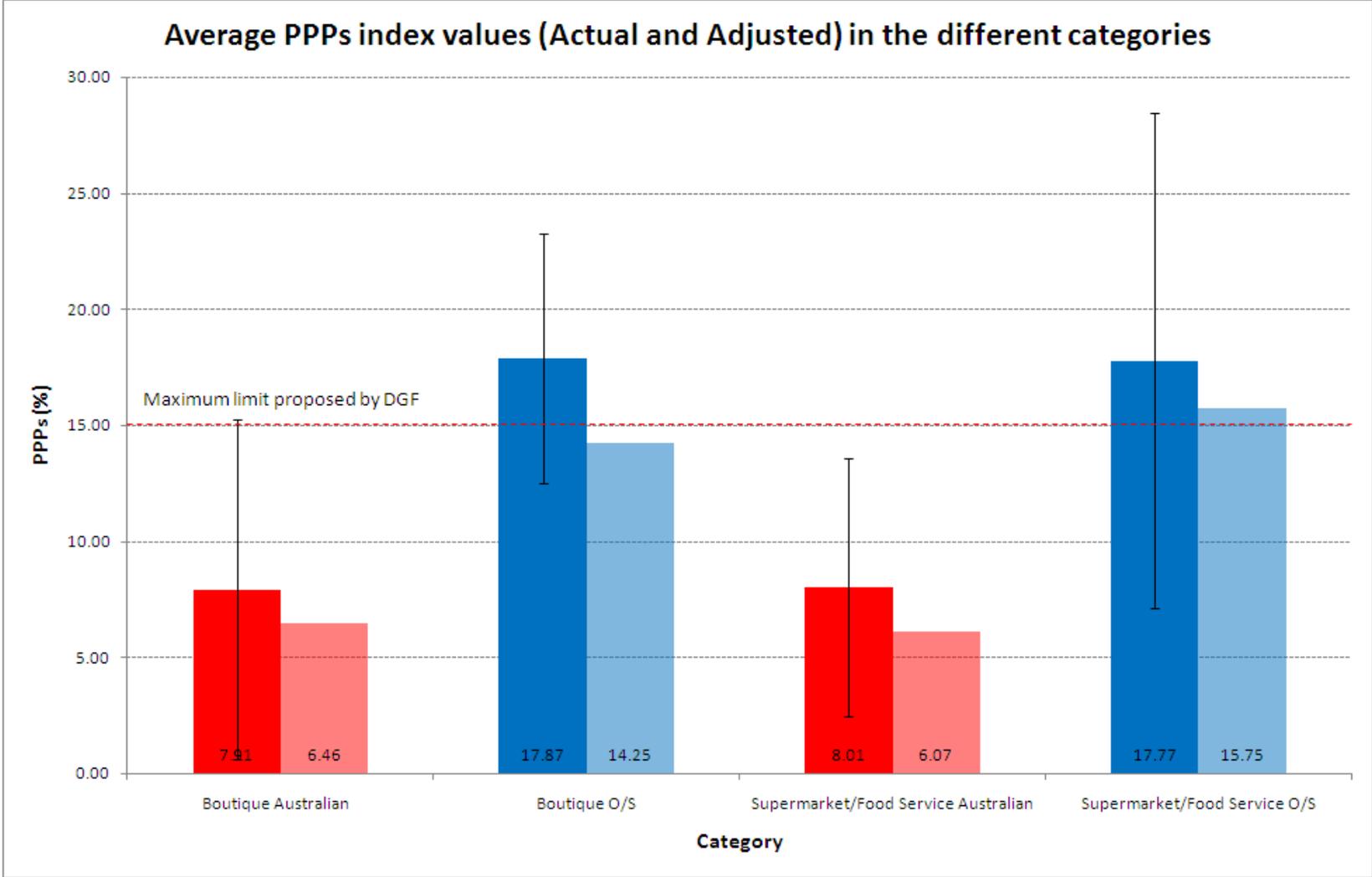
January 2009.

## How many oils?

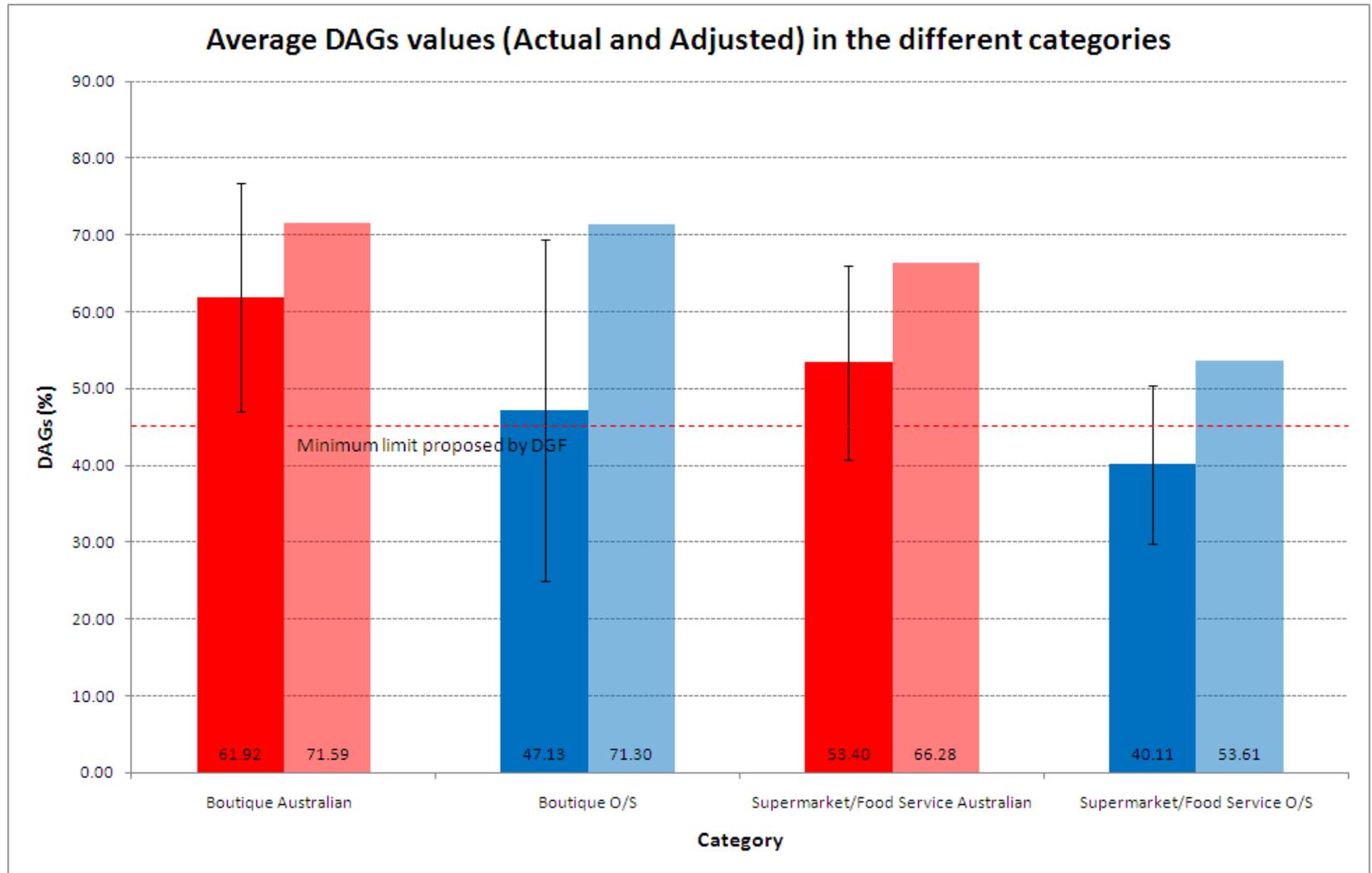
52 Australian.

51 Imported.

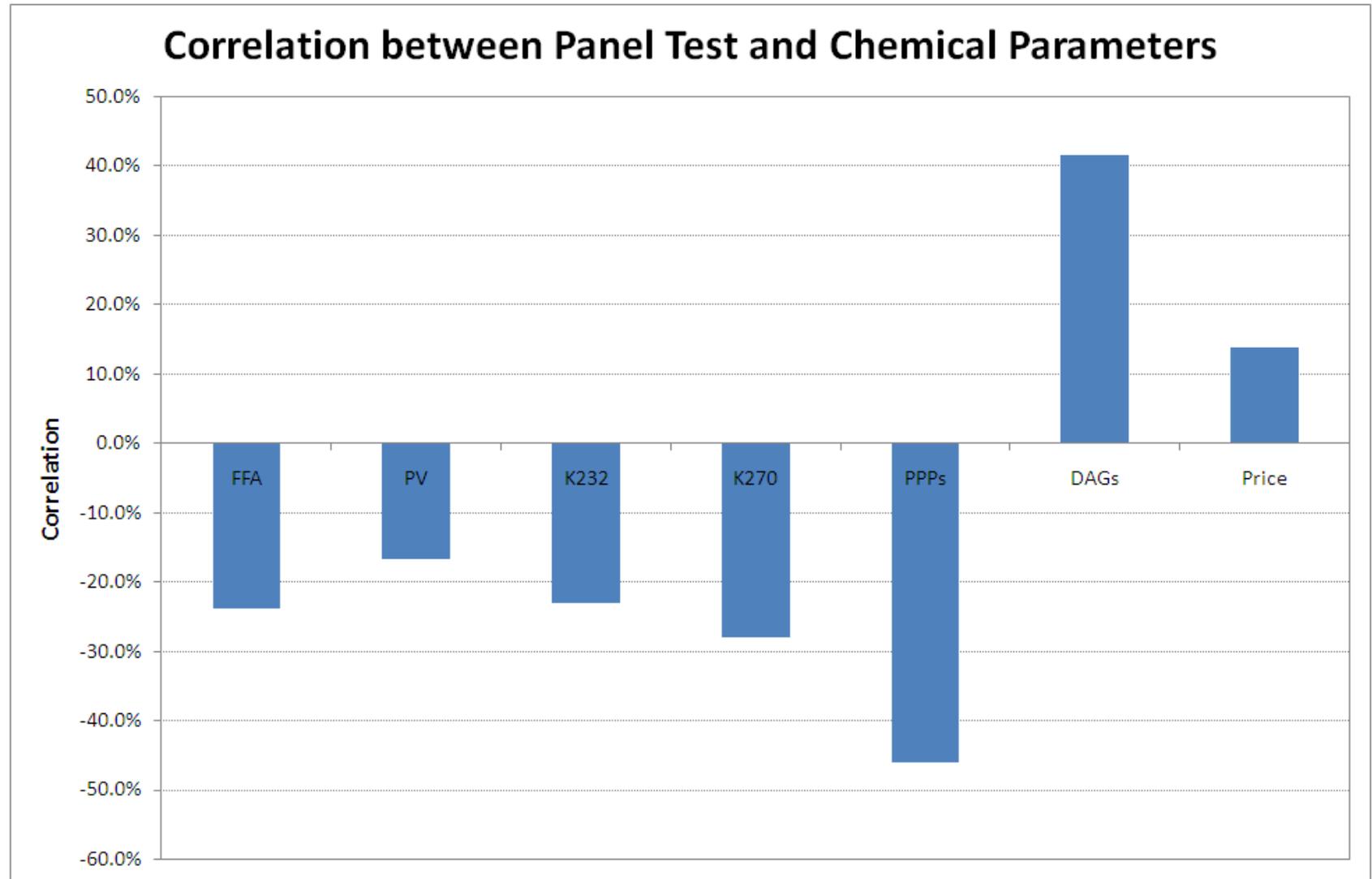
# Supermarket Study - PPPs



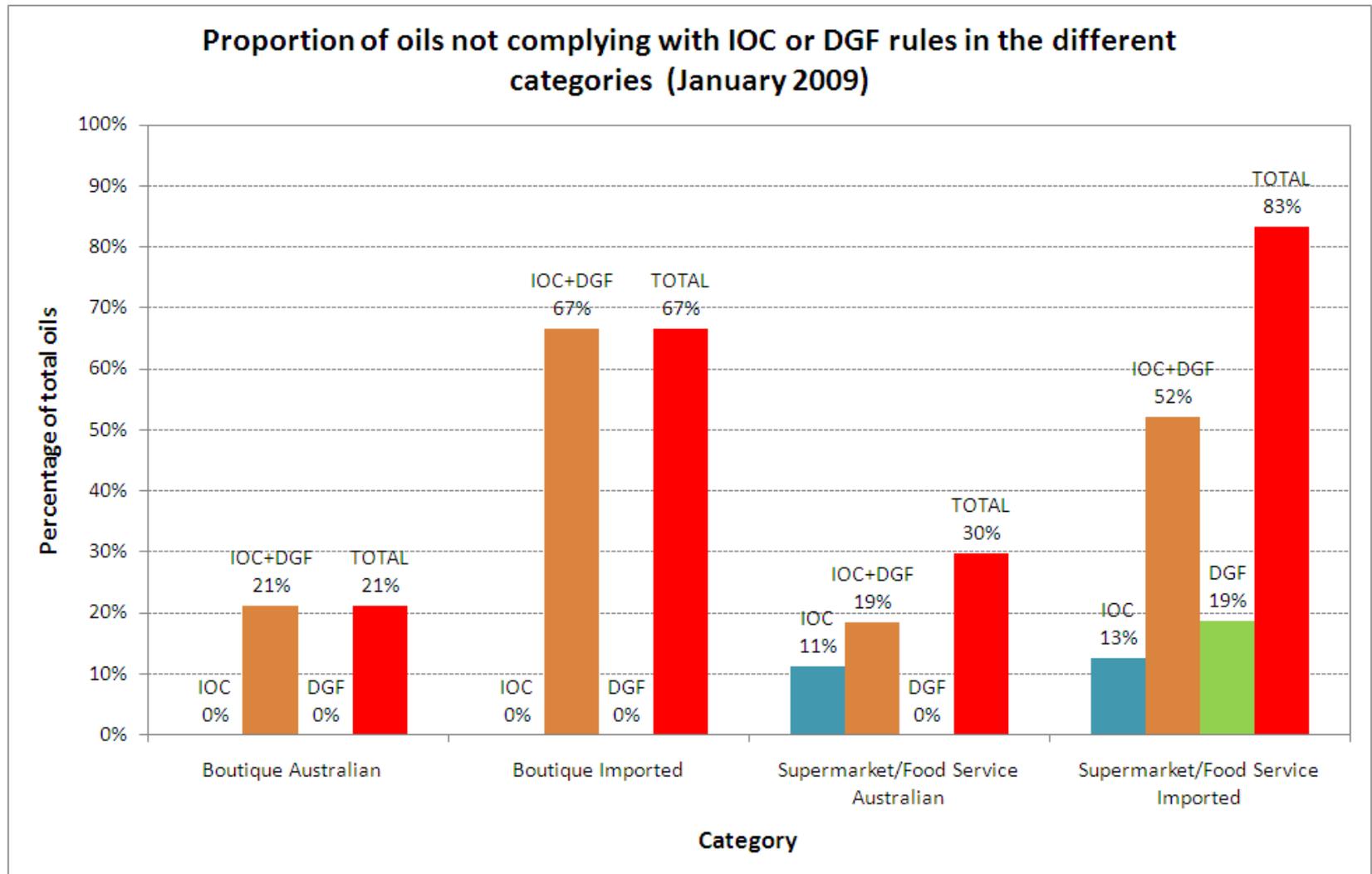
# Supermarket Study - DAGs



# Correlations



# Supermarket Study - Conclusions



# Varieties & Environments Study

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Arbequina	S VIC	3%
Picual	S VIC	8%
Frantoio	S VIC	9%
Frantoio	TAS	0%
Frantoio	WA	6%
Frantoio	NSW	3%
Coratina	S VIC	2%
Koroneiki	S VIC	0%
Barnea	S VIC	18%
Picual	N VIC	4%
Koroneiki	N VIC	1%
Coratina	N VIC	2%
Barnea	N VIC	10%
Coratina	NSW	0%
Barnea	SA	9%
Manzanilla	SA	4%
Picual	WA	5%
Barnea	WA	10%
Leccino	WA	3%
<b>TOTAL</b>		<b>97%</b>

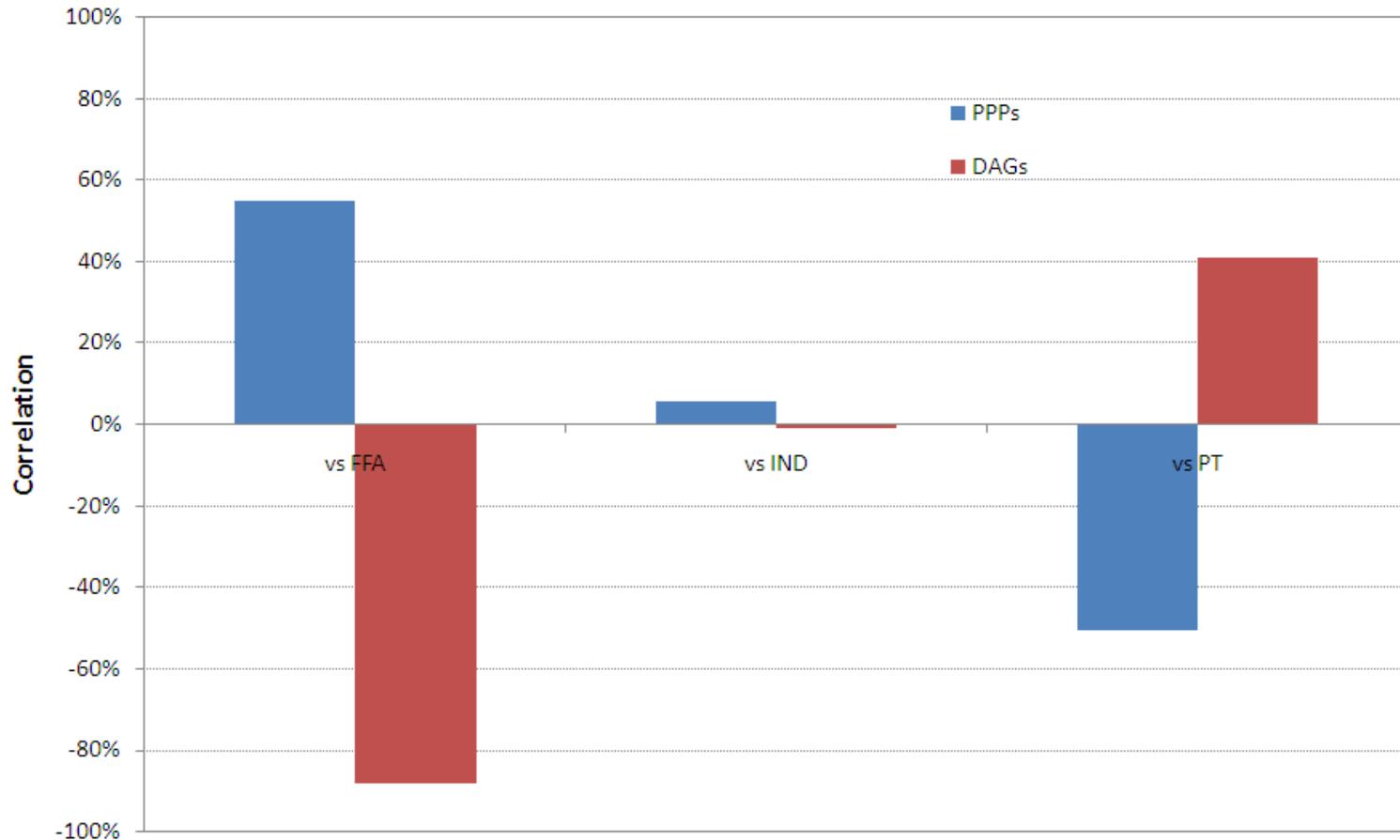
# Varieties & Environments Study

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Parameter	FFA	PV	K232	K270	PPH	PPPs	DAGs
<b>Average</b>	0.22	6.10	1.583	0.097	237	1.94	85.26
<b>Minimum</b>	0.12	3.30	1.243	0.056	77	0.90	74.60
<b>Maximum</b>	0.37	9.50	2.062	0.138	511	4.20	93.90
<b>Limits</b>	< 0.80	< 20.00	< 2.500	< 0.220	-	< 15.00	> 40.00

# Varieties & Environments Study

## Correlations between DAGs, PPPs and Varietal Australian Oils



# Preliminary Conclusions

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- Both PPPs and DAGs seem to be good indicators of overall olive oil quality and freshness.
- PPPs could be a useful tool to detect refined olive oils utilising modern technology.
- No Australian olive oil failed those tests without failing an IOC test.
- There is no evidence of varietal or environmental influence on those tests under Australian conditions.
- The proposed limits of  $< 15\%$  for PPPs and  $> 40\%$  for DAGs seem to be appropriate and rather conservative.

# Thank you

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